

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Statistics
Course number	STAT4311
Faculty	
Department	
Course type	Major Needs
Course level	4
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

- 1 - Identifying ways and methods to estimate the parameters of the populations through the sample data
- 2 - Identifying the characteristics of the estimators such as unbiasedness, consistency and efficiency
- 3 - Comparison between different estimators of the same parameter
- 4 - Deriving estimators for parameters of various statistical probability distributions using different methods of estimation
- 5 - Deriving confidence intervals for the unknown parameters of probability distributions such as the normal distribution and the binomial distribution
- 6 - Mathematically defining elements of the issue related to testing hypotheses, and formulating hypotheses in an easy way to work with statistical methods, as well as to determining the necessary statistic to test the hypothesis
- 7 - Finding the Most Powerfull critical region to test the a simple null hypothesis against a simple alternative hypothesis using the Basic Neiman Pearson Lemma
- 8 - Finding the best region to test a simple null hypothesis against a composite alternative hypothesis using Uniformally Most Powerfull tests and the Uniformally Most Powerfull Unbiased tests
- 9 - Deriving the Likelihood Ratio Test for composite hypothesis
- 10 - The application of methods of testing hypotheses on important practical cases particularly the independence tests and goodness of fit tests

Intended Learning Outcomes

Knowledge and Understanding	<ul style="list-style-type: none">* Identifying the basis of important statistical concepts related to practical situations* Knowledge of the philosophy behind testing hypotheses* Identifying the basic theories of hypotheses testing
Intellectual Skills	<ul style="list-style-type: none">* Distinction between estimators and identifying the best estimator for a parameter* Derivation estimators for unknown parameters of probability distributions using different methods* Deriving confidence intervals and interpret them* Using mathematical analysis to derive the appropriate tests of hypothesis
Professional Skills	<ul style="list-style-type: none">* Recognizing the difference between an estimator and a statistic and a parameter* Linking mathematical concepts with practical methods which can be used in data analysis* Finding estimates of the parameters using different method and distinction between them* Finding statistical tests of hypotheses in different ways and to distinguishing between them* The application of the philosophy of testing hypotheses on important practical cases* Application of the most useful methods of designing hypotheses tests on practical situations* Formulation of statistical hypotheses correctly

Course Contents

1 - Properties of good estimators
2 - Methods of point estimation
3 - Confidence Interval Estimation
4 - Basic definitions of hypotheses testing
5 - Neyman Pearson basic Lemma
6 - The Uniformly Most Powerful Tests
7 - The Likelihood Ratio Tests
8 - The applications of the Likelihood ratio tests on independence and goodness of fit tests

Teaching and Learning Methods

1 - Lecturing
2 - Homeworks
3 - Discussion and Problem Solving

Teaching and Learning Methods for the Disabled Students

1 - NA

Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
Midterm Exam	8th week	30
Homeworks	All weeks	10
Final Exam	16th week	60

Books and References

Essential books	OKasha, Mahmoud and El Krunz, Saady (2014), Secon edition, "Mathematical Statistics", Al Quds Open University, Jerusalem, Palestine
Recommended books	Hogg, R. and Craig, A.; " Introduction to Mathematical Statistics, 4th ed., Macmillan, N.Y.,1978. Larsoh, H.H. ; " Introduction to Probability Theory and Statistical Inference , 3rd ed., WileyN.Y. 1982, Bickel, P.J. and Doksum, K.A., " Mathematical Statistics : Basic Ideas and Selected Topics", Holden Day , Inc., Oaklan, California, 1977. Freund, J.E. & Walpole, R.E. ; " Mathematical Statistics", 3rd ed., Prentice/Hall International editions, 1980.

Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
Properties of good estimators	1-2		Identifying the basis of important statistical concepts related to practical situations	Distinction between estimators and identifying the best estimator for a parameter	
Methods of point estimation	3-6		Identifying the basis of important statistical concepts related to practical situations	Finding estimates of the parameters using different method and distinction between them	
Confidence Interval Estimation	7-8	Identifying the basis of important statistical concepts related to practical situations	Deriving confidence intervals and interpret them		
Basic definitions of hypotheses testing	9-10	Identifying the basic theories of hypotheses testing		Formulation of statistical hypotheses correctly	
Neyman Pearson basic Lemma	10-11	Knowledge of the philosophy behind testing hypotheses			
The Uniformly Most Powerful Tests	11-13			Finding statistical tests of hypotheses in different ways and to distinguishing between them	
The Likelihood Ratio Tests	14			The application of the philosophy of testing hypotheses on important practical cases	
The applications of the Likelihood ratio tests on independence and goodness of fit tests	15			Application of the most useful methods of designing hypotheses tests on practical situations	